The Railway and Locomotive Historical Society

Bulletin No. 13

BOSTON, 1927

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Some of the more interesting "source" items on early railways and locomotives are not easily available—by reason of their rarity—being in few collections or public libraries.

It has been the policy of this Society (as our limited space permits) to reprint occasionally a rare and important "source" article in our regular bulletins, in connection with historical articles prepared by the members. This places such information in the hands of all our members, and also makes it available for reference in the libraries having our bulletins. Appreciative comment was received on the three articles of this character previously published:

- Narrative of Excursion on the B. & O. Ry. (1832). Bul. 6
- List of Locomotives in this Country in 1838. " "
- Report on the early Locomotives on the South Carolina Canal & Railroad Company. Bul. 7

It was the intention to issue the attached report on locomotive engines in service in the eastern part of the United States in 1838 in the next bulletin, but on final consideration it was thought best to publish this reprint in a separate bulletin, in view of its length, and issue to the members with our current bulletin. It is, therefore, going out with a separate serial bulletin number, in connection with Bulletin No. 14 containing the usual miscellaneous articles.

The Railway and Locomotive Historical Society, Inc.

JULY, 1927
BOSTON

REPORT

UPON THE

LOCOMOTIVE ENGINES,

AND THE

POLICE AND MANAGEMENT

OF SEVERAL OF THE

PRINCIPAL RAIL ROADS

IN THE

NORTHERN AND MIDDLE STATES,

BEING A SEQUEL TO THE REPORT OF THE 8TH OF JANUARY, 1838,

UPON

RAILWAY STRUCTURES,

BY

J. KNIGHT, CHIEF ENGINEER,

AND

BENJ. H. LATROBE, ENG'R OF LOCATION & CONSTRUCTION.

REPORT.

ENGINEER'S OFFICE, BALTIMORE AND OHIO RAIL ROAD,
Baltimore, May 14, 1838.

TO LOUIS MCLANE, *President*
Baltimore and Ohio Rail Road Company.

ON the 8th of January last we submitted our report, containing descriptions of several of the most important rail roads in the middle and northern States of the Union, with details of the plans of construction employed upon them; together with sundry observations relating to rails and fastenings; and to which was added a plan for the construction of a new track upon the Baltimore and Ohio rail road, that should be suited to an economical use of locomotive engines. And we now make the following report in relation to the police, management, and locomotive engines upon most of the rail roads above alluded to, and which we visited under your directions.

LONG ISLAND RAIL ROAD.

This road will be 93 miles long when completed, extending from the landing on East river in Brooklyn, over the even surface of Long Island; and, with the Stonington rail road, to which it may be connected by means of a steam boat line across the sound, will form a line of speedy communication between New York and Providence. At present, the only portion of this road completed is that from Brooklyn to Hicksville, 27 miles, upon 24 of which the transit is effected by locomotive steam engines, whilst upon the three miles from the wharf at Brooklyn to Bedford, the power employed is that of horses exclusively. To the politeness of James Shipman, resident engineer and agent, we are indebted for the following particulars:

Locomotive Engines.

1st. *Repairs of Engines.*—On this head the information given was not precise. The agent thought that the daily cost of repairs upon the *Lowell* engine did not exceed $2 00, and upon the engine of Baldwin's make, $1 50—each engine performing two circular trips of 48 miles, equal to 96 miles of daily travel. These sums, however, do not include any allowance for general depreciation or renewals.

2d. *Fuel consumed by Engines.*—The Lowell engine burns one cord of wood in each circular trip of 48 miles, conveying an ave-

rage load of twenty tons of freight, in four cars, each weighing two tons—the weight of engine being 8¼ tons, with its fuel and water in the boiler, and having six tons on the two driving wheels; the tender weighs 4½ tons with fuel and water, the additional quantity of wood consumed in getting up steam, being about one-fifth of a cord. Baldwin's engine burns, in addition, about one-eighth of the quantity just stated in doing the same amount of work. The cost of the wood prepared for the engines averages $4 75 per cord; the Virginia pine being preferred—Pitch pine makes smoke and sparks that clog the wire netting over the chimney.

Titles, duties and compensation of the officers of the road.

Beside the *President and Directors*, there is a *Vice President*, who, as principal executive officer, gives a general superintendence to the operations of the concern—Salary, $2,000 per annum.

Resident Engineer and Agent—who, as the representative of the vice president, superintends the transportation, repairs and machinery—Salary, $3 00 per day.

Master of Enginemen, or Head Machinist—Superintends the workshop in which the repairs of cars and engines are conducted. Once in each month he closely inspects all the machinery in use upon the road—Pay, $2 50 per day.

Ticket Masters—Stationed at the principal depots on the line. There are at present three of these officers, one at Brooklyn, one at Jamaica, and one at Hicksville. Two additional ones would be required were the road completed. Their duty is to sell tickets and make all book entries—Pay, $700 per annum, each.

A Conductor of the passenger trains—receives tickets from the passengers, and cash from those who travel from places where there are no ticket masters, or who have neglected to procure tickets where they were to be had—Pay, $700 per annum.

First Engineman—runs always with the passenger train, and is selected for his superior skill and character—Pay, $2 00 per day.

Second Engineman—runs with the burthen train—Pay, $1 50 per day.

Firemen—for all engines running—Pay, $1 00 per day, each.

Brakemen—One for every two cars; and they are to attend to the baggage—Pay, $1 00 per day, each.

Two Blacksmiths—engaged in the repair shop, and in shoeing horses, &c.—Pay, $1 50 per day, each.

One Carpenter—for repairing railway, erecting buildings, &c. Pay, $1 75 per day.

Six horse drivers—Pay each, $30 per month.

One Yard master at Bedford, to attend to the horse establishment, &c.—Pay, $1 50 per day.

Six track repairers, engaged in repairing railway—Pay $20 per month, each.

Twenty-four laborers in the same service—pay also, $20 per month.

These last work under the immediate supervision of the resident engineer and agent.

Ticket System and Tonnage business.

The ticket masters sell in their offices, tickets giving the right of passage from their own depots to the various stopping places on the road. The fare of the passengers getting in at places where there are no ticket masters is received by the conductor, who returns it to the ticket master at the end of the same trip; and the money so received and returned by the conductor is entered in a separate book from that in which the ticket master records his receipts of money for passengers. In this latter book is entered the date of the trip; name of locomotive engine; time of starting, and time occupied in the trip; the number of cars and number of passengers; and the amounts received for passengers and baggage, the latter at the rate of 2½ cts. per mile, for every 100 lbs. over 50 lbs. for each person.

Two trips per day from Brooklyn to Hicksville are made at this season, (November 16th) and in the summer three, and sometimes more. The passenger cars are lettered from A to Z, and the tickets are lettered correspondingly.

Miscellaneous.

The flanges of the engine wheels are 1¼ inches deep, and their play is from 1½ to 2 inches.

The well at Hicksville to supply the engines with water, is 80 feet deep, and dug in a continued bed of gravel. The water is elevated by the power of a horse, that likewise drives a circular saw to cut up the wood for the fuel of the locomotive engines.

New Jersey Rail Road.

Locomotive Engines, fuel, and the ticket system.

Of the repairs of engines, no specific information could be obtained. A preference, however, was expressed for the engine of Baldwin's make, on the ground of its wearing better than others either of English or American manufacture.

It was not convenient when upon this road, to procure an account in detail under this head; and we accordingly requested of George L. Schuyler, the superintendent of transportation, to give us the necessary information in writing. The following extract from his letter to us, of the 2d December, 1837, contains all the information upon these subjects which he was enabled to give; and it will be seen to be full as relates to the tickets: He says, "I am unable to furnish you with any correct statement of the repairs of Baldwin's engines. Not having completed our workshops, so much of the repairs have been done in other establishments, without keeping separate accounts of each engine, that I cannot furnish a statement of sufficient accuracy to be useful.

"On our road between Newark and New Brunswick, with a train of six four-wheel cars, and a baggage car, at a speed of 20 miles the hour, one cord of wood carries us 44 miles. With a

heavy load, say 10 cars and baggage cars at 16 miles per hour, $1\frac{1}{16}$ cord carries us the same distance.

"I will endeavor to explain our ticket system, by selecting two important points on the road, Newark and Rahway, and giving you the form of tickets, &c. This will explain the plan, and of course it can be extended (and is with us) to all stopping places of sufficient importance on the line of a rail road.

"We have a ticket office at New York, and one at New Brunswick—At these offices passengers procure tickets to any point on the road.

"We have two conductors with each train—one of them sees that all passengers have tickets, selling them to those who are not provided; he sells a ticket to each passenger who gets in at Newark, likewise to each one who gets in at Rahway. The other agent collects at the proper time every person's ticket.

"The superintendent of the road every Monday morning furnishes the ticket officers with a quantity of tickets of the various combinations—for example—New York office:

New York to New Brunswick,	500	at	$1 00,	$500 00
New York to Rahway,	500	at	1 00,	500 00
New York to Newark,	500	at	1 00,	500 00
Newark to New Brunswick,	500	at	1 00,	500 00
Rahway to New Brunswick,	200	at	1 00,	
Newark to Rahway,	200	at	1 00,	

"These tickets are signed (it requires a clerk to attend to this; we have 1600 in circulation) and charged to the agent of the ticket office as so much money—Every Saturday night his return (a printed form) is made out, of the week's work, giving the number of passengers to each place each day. He then pays over the money he has received, which of course is a part of the sum which has been charged to him—for the balance he produces his tickets on hand.

"The *selling Conductor* receives, *every morning*, a proper number of each kind of tickets from the ticket office agent—a very few of New York to Newark, New York to Brunswick, and New York to Rahway, to supply those who have not procured their tickets at the office. Of Newark to Rahway—Rahway to Brunswick, &c., he must have enough for all the passengers. *Every night* he returns to the ticket office agent his tickets on hand and money for the residue. The ticket office agent then incorporates this with his own sales for the day, to simplify the weekly return.

"The *collecting Conductor* collects a ticket from each passenger, at night seals them up, directs them to the superintendent and deposites them in his office.

"This system has been in operation two years, and has given general satisfaction to our company. The agents in the ticket offices cannot defraud without combining with *both* conductors. One conductor cannot defraud without combining with the other, and none of them without the risk of detection by an observing passenger.

"One great advantage is the minute information recorded of the number of passengers each day between any two places. I consider this fully equivalent to the expense of having two conductors. These conductors regulate the speed of the trains, and have charge of passengers, baggage, &c. If is thought advisable to have a check on the superintendent, the system would be more complete by having the tickets signed by two names, like bank bills."

Boston and Providence Rail Road.

Locomotive Engines.

This company owns ten engines, the names, weight, cost, and the dimensions of some of the parts of which, are, as in the following

TABLE.

Name of Engine.	Names of builders.	Weight with fuel & water.	Weight on driving wheels.	Diameter of driving and small wheels.	Cost of Engine.	REMARKS.
		lbs.	*lbs.*	*ft.* *ft.*	*Dolls.*	
Boston.	Bury of Liverpool.	18,350	11,470	5 and 3	6,900	Four-wheeled Engine, cylinders 11 in. diameter by 16 inch stroke.
New York.	Forrest of Liverpool.	23,360	13,370	5½ & 4	7,000	Four-wheeled Engine, cyl. 11 in. by 18 in. stroke.
Baldwin, Nos. 1, 2 & 3	Baldwin of Philadel.	19,600	8,800	4½ & 2½	6,500	Six-wheeled Engines, cyl. 11 in. by 16 in. stroke.
Whistler, Nos 1, 2 & 3	Lowell Co. Mass.	17,885	11,470	5 & 3	7,000	Four-wheeled Engines, cyl. 11 in. by 16 in. stroke.
Young, Nos. 1 & 2.	New Castle Co. Del.	17,920	13,440	5 & 2½	6,000	Six-wheeled Engines, cyl. 11 in. by 16 in. stroke.

The engine first above named, the *Boston*, weighs, without fuel and water, 15,590 lbs.

The engines called "Young, Nos. 1 and 2," are represented as being slightly built, one of them having cost $600 to put it into running order when first received and new. Their power to generate steam with an economical consumption of fuel, was, however, favorably spoken of—The number of tubes in each of them is 136, each of 1¼ inches diameter. The "New York" has 54 tubes of 2 inches diameter; whilst Baldwin's engines have each 118 tubes of 1¼ inches diameter.

Repairs of Engines.—Upon this head no satisfactory information could be procured at this time; but a detailed statement of the cost of repairs upon the different engines above named, for the last year, was promised to be forwarded soon after the 1st of January last, but which it was found could not be furnished, in consequence of the accounts having been blended with the repairs of

cars. It was remarked, however, that Baldwin's engines cost the least in repairs.

Consumption of fuel by Locomotives.—The quantity of wood (dry pine) burnt by a locomotive in the journey of 41 miles between Boston and Providence, is $1\frac{1}{8}$ cords, inclusive of getting up steam. Of the above engines, those made by Baldwin, burn rather the most wood, for the same amount of work done. The cost of the wood prepared for the engine is $7 per cord, of which the sawing and splitting is $1. The New England pitch pine is preferred. The average load conveyed by an engine, with the above consumption of fuel, is 125 passengers in 5 cars, weighing $2\frac{1}{2}$ tons each, and making with the passengers a gross load of about 25 tons, carried at a speed of 20 miles an hour.

Performance of Locomotives.—We were furnished with the following statement of an experimental performance of the "Boston" engine described above; by which it appeared the "Boston" drew, on the 5th September, 1837, from Boston to Providence, the following designated load under the circumstances detailed. The tender of the engine weighed, with its supply of fuel and water, 14,418 lbs. The load, exclusive of the tender, was—

10	First class passenger cars, weighing -	58,000 lbs.
2	Second do do do -	8,420 "
3	Baggage do do -	14,615 "
233	Passengers, at 150 lbs. each - -	34,950 "
	Baggage - - - - -	18,000 "
	Making a total of $59\frac{1}{10}$ tons, - -	133,985 "

It was thought that in addition to the above load, the engine would have drawn one first class passenger car full; say 9,700 lbs. $= 4\frac{1}{2}$ tons.

The trip was made in the following times and stages. Left Boston at 5 minutes past 1 p. m., went 8 miles and stopped 1 minute, proceeded 6 miles further to Canton, at which place arrived at 2 p. m., stopped there 5 minutes, thence $4\frac{1}{2}$ miles to Sharon depot, at main summit of road, arrived at 2 hours 25 minutes. The grade leading to this summit is $37\frac{1}{2}$ feet per mile, for several miles in succession. The load of the engine would not have permitted, it was thought, to have started upon this grade, had the train halted upon it. Arrived at Taunton branch, $5\frac{1}{2}$ miles further, at 2 hours 39 minutes, stopped 4 minutes, arrived at Attleboro', 3 hours 4 minutes, stopped 1 minute, and arrived at Providence at 3 hours 30 minutes. The road descends constantly, or rather has no ascent from Sharon to Providence. Time occupied in the journey of 41 miles, 2 hours 35 minutes.

The cars upon this road are four-wheeled, and weigh, empty, about 5,800 lbs. each; and, it was stated that their resistance to traction in the straight and level parts of the road had been found to be at the rate of 9 lbs. per 2000 lbs. of the weight, being equal to $10\frac{1}{80}$ lbs. per ton of 2,240 lbs.

The resistance of the load drawn on a level, was therefore, (exclusive of the friction of the engine and tender) 603 lbs.
The resistance from gravity of the entire train up the ascent of 37½ feet per mile, was 1163 "

Total resistance, 1766 "

As the weight on the driving wheels was 11,470 lbs., consequently the adhesion called into action was about the $\frac{1}{6.5}$ part. The rails were, therefore, in good condition for adhesion, and the load considerably greater than that of ordinary work, with trains of heavy freight; the adhesion of from $\frac{1}{7}$ to $\frac{1}{8}$ being the extent that can be usually employed.

System of Superintendence and management of the Road.

The following account of the titles, duties, and compensation of all the executive officers in the service of the company, will exhibit the system of operations in all the departments.

General Superintendent.—This officer has charge of the transportation, and of the repairs of both road and machinery. His salary is $2,500 per annum, and travelling expenses; making his compensation equal to about $3000 per annum. He is the chief executive officer, and has a control over all those hereafter named as attached to this road. From the present incumbent, Wm. Raymond Lee, Esq., we derived our information concerning the Boston and Providence road and its operations.

The *depot* officers are as follows:

Two Masters of Transportation.—One at each of the principal depots; namely, at Boston and at Providence. Their salaries are $1250 per annum each. Their duties, to forward passengers and merchandise, each from his end of the road. Each makes all his returns to the General Superintendent. Each has a clerk whose sole business it is to make all book entries relating to passengers. His salary is $500 per annum.

The organization and management of the two main depots are alike in all respects, except that the storekeeper at Providence has no clerk.

The depot agent for *forwarding merchandise* consists of a *storekeeper*, at a salary of $600 per annum, who receives and weighs goods, which must be accompanied by a descriptive memorandum from the person sending them. The storekeeper first enters them upon a *slate*. He has a clerk, at a salary of $500 per annum, who copies the slate entries and the bills of lading made out from them, into a book. This clerk assists the clerk of the master of transportation in selling tickets as hereafter described. The storekeeper has under him a sufficient number of common hands, (three at this time) at a per diem allowance of from $1 to $1 12½ for the time they are actually at work. They load, unload, weigh and handle the goods or packages, and one of them oils the cars of the merchandise train. These laborers do all the hand-moving of the bur-

then cars at the depots, placing them upon their proper tracks, and getting them ready for starting in their train.

The Baggage Master has special charge of the passengers' baggage. His pay is $1 25 per day for every day in the week.

The above are the agents resident at the main depots at each end of the road.

Way Agents of Transportation.—Of these there are *nine* stationed at an equal number of intermediate depots along the road. These agents are selected from among persons living in the vicinity, whose time is not so entirely occupied by the duties of their agency as to prevent them from attending to other business. Their pay is $1 per day for every day in the week.

These agents pay to the conductor of the merchandise train, the freight upon all articles delivered at their own intermediate depots, on being shewn by the conductor the *way bill* of lading, on which said articles, with the charge for freight due on them are entered. The conductor hands the sums so received by him to the storekeeper, either at Providence or Boston, according as the train is going towards the one or the other place.

The Ticket System.—The cars and tickets are designated by letters, and the tickets are in charge of the *master of transportation*, who gives a certain number of each letter to the storekeeper's clerk, who puts them into pigeon holes in a box, and sells them out to passengers as they apply at the ticket office. The clerk of the Master of Transportation records the name and amount, as each ticket is disposed of. Before the train leaves the depot, the Master of Transportation, assisted by the conductor, collects all the tickets from the passengers, and returns them at once to the ticket office, where they are counted and compared with those left in the pigeon holes, and note taken of any missing tickets.

There are two classes of passenger cars, the first at $2 per passage for the whole distance between Boston and Providence, and the second at $1 50 for the same distance. The latter cars are roughly built—From the lettering (or designation) of the cars a great advantage is considered to be derived in the classification of passengers, and in putting together persons of the same party, &c.

Travelling Agents.—A conductor for each passenger train, whose pay is $600 per annum, makes a circular trip of 82 miles daily; attending to the comfort of the passengers during the journey, and receiving all *way fare* between intermediate points of stopping. He has control of the trains after they have left the starting place, up to which time he is under the immediate orders of the Master of Transportation, from whom he receives his orders to start the train. The conductor has no concern with the baggage, as that is under the exclusive care of the Baggage Master.

A brakeman to every two passenger cars is the number of such agents required by a law of the commonwealth of Massachusetts. These also assist the Baggage Master in handling the baggage. Their pay is $1 00 per day, for every day in the week.

Locomotive Engineman.—Pay $2 00 per day—The day's work being a circular trip of 82 miles.

Fireman.—Pay $1 00 per day—which Mr. Lee considers too low. The enginemen are subject in all respects upon the journey to the orders of the conductors.

All travelling agents wear upon their hats, badges descriptive of their offices.

The department of machinery is conducted by an officer, called the *Master Engineman* or *Machinist*, who superintends the machine shop. His pay is $3 00 per day, for every day in the year, and he has charge of the whole moving power. He has under him three machinists, at a pay of from $1 50 to $1 75 per day, each; a blacksmith and attendant at $2 00, and $1 00 per day, respectively. The enginemen of the spare engines work in the machine shop, and the Master Engineman works himself, as a hand, and he purchases all materials wanted—an account of his purchases is kept in a pass book, which is in charge of the Master of Transportation.

After each trip the engineman running the engine examines it carefully, and reports its condition to the Master Engineman or Machinist.

Passenger and burthen cars are constructed in the company's shop. A very handsome passenger car, in which we rode, had just been built, at a cost of $875—such as at the Lowell manufactory, as was stated, would be asked $1,000 for. This car was upon 4 wheels, and arranged to accommodate 26 persons. It appears, however, now to be conceded *here*, as well as upon the other rail roads in the north generally, that the large eight wheeled car for passengers, is preferable, and must be adopted.

Since our visit to this road we have been kindly favored by the General Superintendent, William Raymond Lee, with a communication under date of the 12th December last, containing a copy of the general instructions to the Master Engineman, in which his duties are more particularly detailed, as follows:

Master Engineman.

1. He is charged with the immediate superintendence of every thing connected with the "moving power:" Under his direction, all repairs of locomotives and cars will be executed; to effect this he will employ a suitable number of hands in the machine shop and car shop under the approval of the general superintendent, and also purchase all necessary materials.

He will establish and preserve usual shop hours: keeping a record of all work done in the shop, distinguishing the kind of work, as well as the number of days employed in repairs of each kind, and on each particular locomotive. He will also note the time of all absentees, with the reason of their absence; and will, at the end of each and every month, make a report to the general superintendent, exhibiting the work done in the shop, &c., as per the foregoing instructions.

2. The Master Engineman will frequently examine running engines, and occasionally accompany the enginemen in their usual trips over the road; and it is his duty to counsel, advise and instruct them in each and every particular of their duty and business—Above all, he is expected to set them a good example of correct deportment, and implicit obedience to these instructions, which the surperintendent has established for the safe and speedy transportation of passengers and merchandise.

3. He will enforce on the part of the enginemen, a strict and daily examination of their respective machines, and will see that they do not neglect to clean, &c., after each and every trip.

4. The Master Engineman may grant leaves of absence to hands for less than a day, if their services be not required in the shop; but absences for a longer period must be approved by the General Superintendent, or, in his absence, by the Master of Transportation.

5. The Master Engineman is responsible for all materials and tools used in his department; a strict economy in the use of the former, and of care in the preservation of the latter, is confidently expected of him. He will, at the end of every half year, say, January 1st, and July 1st, furnish the superintendent with a schedule of all materials, whether of wood, iron, &c., together with all tools, &c., on hand.

6. He will make a monthly report of the condition of the "moving power" to the General Superintendent, as per blank returns furnished to him, and will, from time to time, report and suggest, &c. as the interest of the department may require.

7. On the occurrence of an accident which may have disabled or injured any engine or car, the Master Engineman will immediately make an examination of the extent of the injury, &c. and report the result to the General Superintendent, or, in his absence, to the Master of Transportation, at Boston.

8. When the Master Engineman wishes to purchase any material for the use of his department, he will report to the office of the Master of Transportation the nature and amount of the purchase to be made, and will receive the necessary "pass book," which he will take to the shop where the purchase is to be made, and will have the material, weight, &c. with cost, entered on the pass book. This rule will be observed, whether the purchase be large or small.

Mr. Lee adds, that the Master Engineman is also instructed particularly, as circumstances may require, and that one important rule not embraced in the foregoing is, that "all instructions, &c., to enginemen will be communicated through the Master Engineman;" and this is intended to give him a proper position in the eyes of his subordinates.

For a copy of the printed "instructions for Conductors and Enginemen, while passing over the road," adopted for the Boston and Providence rail road, see accompanying paper marked A.

Repairs of Railway.

The whole road of 41 miles in length is divided into two divisions. The first, next to Boston, being 19 miles long, (a branch 2¼ miles long being affixed to it) the second, being 22 miles long. Each division is under the charge of a Road Master, at a salary of $800 per annum. And each division is divided into two subordinate divisions of about 10 miles each. Upon each subdivision a separate party of workmen are employed under a local supervisor, whose pay is from $1 25 to $1 50 per day, and who has under him a rough carpenter, at from $1 25 to $1 37½ per day, and four laborers at from 75 to 87 cents per day. The carpenter and common hands are paid only for the days they work on the road.

The Road Master's duty is to keep the railway and road bed in proper repair. He reports to the general superintendent once a month, all new materials, with the reasons for their use, and the points of the line on which they are employed, together with the causes of destruction or decay of the old materials for which the new ones have been, or must be, substituted. In this respect the condition of his division is particularly described, and suggestions made as to the repairs, and of amendments of the plan of construction, &c. The road master also looks after the bridges, and sees that they are properly keyed up, &c.

The cost of repairs of road during 1836, amounted, for the whole line of 41 miles, to about $15,000, principally for keeping up the rail track. The general superintendent thinks that $12,000 will pay for the repairs for the year 1837.

There are 1200 feet in length of wooden bridging on the line, in different structures, which are upon Long's patent, and averaged a cost of $22 per lineal foot, for spans varying from 30 to 125 feet. This form of truss, however, is not much liked here for railway bridges on account of the difficulty of preventing deflection, and of restoring the level when lost.

Boston and Lowell Rail Road.

Through the politeness of Patrick T. Jackson, the President, and Charles S. Storrow, General Agent for transportation and repairs of this road, we obtained the following information:

Locomotive Engines.

Of these machines the company have 6, of which 5 (including the "Patrick," hereafter mentioned) are exactly alike. The sixth is of Stevenson's make, and weighs a little over 20,000 lbs., and it took on one occasion, 47 cars of merchandise to Lowell, in two hours and a half; the load being equal to 205 tons of 2240 lbs. each.

Four of the locomotive engines are constantly employed in carrying passengers and freight; and they average among them ten

single trips per day over the road, or a distance of 260 miles for every day in the year, being 65 miles per day for each of the four engines.

A fifth engine is employed in hauling gravel, and makes perhaps as many miles per day as the average of the rest. The sixth engine is the spare one.

The average tonnage conveyed by the engines drawing freight has been 67 tons per day, from Boston to Lowell. The time occupied by each passenger engine in going once over the road, is 1¼ hours, including stoppages; and the freight engines make the same trip of 26 miles in 2½ hours, likewise including stoppages.

The title of the Lowell Manufacturing Company as appears on the locomotive engines made by them, is, "Proprietors of Locks and Canals, Lowell, Massachusetts," and the largest class of engines built by them is of the following weight and dimensions:

Total weight of engine=20,665 lbs. = 9.22 tons—of which there are on the two driving wheels of 4¼ feet diameter, 13,350 lbs. and on the two forward wheels of 3 feet diameter, 7,315 lbs. The cylinders are 12 inches in diameter, with a stroke of 18 inches.

The following is an experiment with the "Patrick" locomotive, from Boston to Lowell, January 18th, 1837:

Load drawn.	*Weight.*	
125 casks of Lime—at 300 lbs.	37,500 lbs.	
308 sacks of wheat—at 4½ bush.	83,160 "	
80 pieces of cloth,	1,600 "	
Wood and Tapley—320 bags of corn,	35,200 "	
Freight for Boott's Mills,	630 "	
" Suffolk Manufacturing Co.	2,304 "	
" Lawrence do	11,072 "	
" Tremont do	11,865 "	
" Merrimack do	16,000 "	
" Locks and Canals do	18,000 "	
" Lowell Co. do	14,000 "	
" Hamilton Co. do	300 "	
" Appleton Co. do	3,700 "	
10 bbls. flour,	2,140 "	
Sundry groceries,	27,695	
		264,896 lbs.
32 cars, weighing each 3,800 lb.	121,600	
3 covered cars, 5,000	15,000	
Tender, 14,400		136,600
Total, excluding engine and tender = 179 tons gross =		401,496

Time from Boston to Water station,	10¼ miles,	50′
" from water station to Lowell,	15¾ "	1h. 25′
Totals,	26 miles,	2h. 15′

Steam, - - - - - -	70 lbs. per square inch.
Diameter of 2 driving wheels, - -	5 feet.
Cylinders, - - - - -	11 inches diameter.
Stroke, - - - - - -	16 inches.
Least radius of curvature, - -	3000 feet.
Greatest ascent, - - - - -	10 feet per mile.
Weight on driving wheels, - -	= 12,453 lbs.
do on forward wheels, - -	= 5,877
Whole weight of engine,	= 18,330=8.19 tons.

Allowing the friction on a level here to be 8 lbs. per ton, or 1432 lbs., this added to the gravity of the whole train on the grade of 10 feet per mile, equal to 821 lbs. gives for traction, 2253 lbs. = the $\frac{1}{5}\frac{1}{5}$ part of the weight on the drawing wheels; being a higher degree of adhesion than can be counted upon ordinarily.

The following is an experiment made March 25th, 1837, on this road, with the "Stonington" locomotive, belonging to the Stonington Rail Road Company:

Load drawn from Boston to Lowell.

6 cars	45	bales cotton, at	468 lbs.	21,060 lbs.	
	48	"	424 "	20,352 "	
8 "	116	"	476 "	55,216 "	
8 "	118	"	476 "	56,168 "	
1 "	15	"	415 "	6,225 "	
23 cars	342	bales cotton,	- -	159,021 "	
2 "	31	bales wool,	- -	18,343 "	
1 "	92	bags bran, at 60 lbs.	-	5,520 "	
4 "		groceries, &c.	- -	20,622 "	
19 "		coal, weighing 6838 lbs.		129,922 "	
					333,428 lbs.
49 cars.					
	45 cars at 3800 lbs.			171,000	
	4 " 5000 "			20,000	
	Tender = 14,400,				191,000 "

Total exclusive of engine and tender = 234 tons = 524,428 lbs.

Steam, - - - - - -	70 lbs. per square inch.
Diameter of 2 driving wheels, - -	4½ feet.
Cylinders, - - - - -	12 in. diam. stroke, 18 in.
Time of running the whole 26 miles,	51½ minutes.
Weight on the 2 driving wheels, -	= 13,350 lbs.
do on the 2 forward wheels, -	= 7,315 "
Whole weight of Engine	= 20,665 = 9.22 tons.

In this case the traction, (the friction being assumed as before) would be 2930 lbs., being an adhesion of the $\frac{1}{7}.\frac{1}{7}\frac{1}{7}$. As this is greater than we have known in any other case, it is presumed that

a portion of the weight of the tender (as is done upon some other roads) was transferred to the engine, to increase the amount of adhesion in making the ascent up the grade of 10 feet per mile.

The following particulars in relation to the Boston and Lowell rail road, were also kindly furnished by the General Agent, and are for the year commencing the 31st of May, 1836, and ending on the 31st of May, 1837.

The cost of repairs of road, including ditching, draining, rails, &c. - - - - - - - -	$15,340 69
The repairs of engines and cars, - - - -	17,380 41
12,528 passenger cars went over the whole road of 26 miles, with passengers, - - - - - -	152.413
3,298 passenger cars went 15 miles for Andover rail road,	23,342
17,542 burthen cars over the whole road, 26 miles, with —— tons of merchandise, - - - -	34,910
1,280 burthen cars, 15 miles, with do. - - -	2,503
Trips of locomotives with passengers, 26 ms. = 1,744	
do do with freight do = 1,005	
	Miles.
2,749 × 26 =	71,474
Miles run to carry earth or materials for 2d track, =	8,564
Whole number of miles run by locomotives, =	80,038

Entire stock of Engines and Cars.

6 locomotives owned by the company, 4 of which are in constant use.

27 passenger cars.
99 burthen cars.
2 half price cars.
3 baggage cars.
} Whole stock.

Repairs of Locomotive Engines.

No specific account under this head could be obtained, as the repairs of cars and engines are blended; and we could learn only the amount of both together, in the sum of $17,380 41 above mentioned.

Repairs of Rail Road.

The repairs of the 26 miles of road in 1836, amounted to $15,340.69, as already mentioned, which includes the disbursements consequent upon widening the graduation in many of the cuts, and perfecting the drainage of the road bed. The General Agent thinks that $12,000 will have been expended in the year 1837, in the repairs of the railway track, and of the graduation; there being now 36 miles of single track altogether, of which 10 are of the H rail, and 26 (first laid down) are of the fish-bellied rail. He thinks that the annual repairs of a track of 26 miles in length, laid with the H rail, on stone cross ties, &c., as on this road, would be $6,000, or about $231 per mile.

The General Agent in conducting the repairs of the rail road, divides the line into three sections, the two end ones being each 7 miles long, and the middle one 12 miles long: Each section has a supervisor; the one on the Boston section has $40 per month; the one on the middle section, $700 per annum; and the one on the Lowell section, $1 66 per day, for every day in the week. Under these supervisors there are laborers at $1 00 per day each, for the working days; and there is an average of about one such laborer per mile of road.

Police and management of the Road.

The *General Agent*, already mentioned, is the principal executive officer, having charge of the whole of the out door operations of the road; his salary is $3,000 per annum; he receives all the gross revenue, and from time to time pays over to the Treasurer of the company the nett revenue in various sums, generally about $5,000 at a time. Out of the gross receipts the General Agent pays all the expenses of working and repairing the road, and settles his accounts with the Treasurer every six months.

The Superintendent at Lowell, overlooks all the operations of the road at Lowell; his salary is $1,000 per annum. He receives the revenue or fare from passengers, payable at that end of the road, and small casual payments for freight: the large freight bills, accruing principally from the manufactories, are paid to the General Agent at Boston.

The *clerk and ticket seller at Lowell*, sells tickets and makes out way bills for passengers; salary, $700 per annum. Tickets are given from each end of the road to all intermediate stopping places.

The conductor receives all *way fare.*

The *ticket seller at Boston*, has a salary of $500 per annum; he sells tickets and attends to the passengers and their baggage, assisted by one man who handles the baggage, and whose pay is $25 per month. This ticket seller also acts as clerk to the General Agent or General Superintendent.

Master of tonnage transportation at Boston, with a salary of $750 per annum; his duties are to receive, load, unload, and deliver merchandise. He enters in a memorandum book all articles loaded; their weights, description, &c., and returns the entries to the clerk of the General Agent aforesaid, who enters them on a ledger.

Agent at Lowell for distributing merchandize.—His pay is $1 75 per day, for every day in the week.

Clerk and assistant of Master of tonnage transportation at Boston.—This agent's pay is $40 per month.

Conductor.—This agent receives $45 per month; and there are two conductors in the passenger trains each; and likewise a *Brakeman* to every two passenger cars—pay $30 per month.

There is a conductor and a brakeman to each merchandise train; pay as above.

The pay of the engineman is $2 00 per day, and of the fireman $30 per month.

A common hand is here preferred for a fireman, because, as is alleged, he aspires less to become an engineman, and is, consequently, more contented with his pay and situation than if he were a mechanic, possessing a knowledge of the engine, such as to fit him to take charge of it.

Each passenger and tonnage engine in summer makes two circular trips, or 104 miles in a day, whilst three single trips, or 78 miles in a day, is thought to be work enough for an engineman.

Machine Repair Shop.

There is one of these at Boston, and one at Lowell, each under the care and management of a head machinist, each at a salary of $75 per month. At the Lowell shop there is a blacksmith at a pay of $60 per month, to assist the head machinist there; and there is a similar *smith* in the Boston shop (which is the principal one) likewise at $60 per month. In addition to which last, there are two or three inferior blacksmiths, at $36 per month each.

Miscellaneous.

The capital of this company is stated to be $1,500,000, on which, in the year 1836, a dividend was made of between 6 and 7 per cent. The expenses of working and repairing the road were $80,000, of which, as before stated, the repairs of the road amounted to - - - - - - - - - - $15,340 69
And the repairs of locomotives and cars, to - 17,380 41

Total repairs of road and machinery, - - $32,721 10
Leaving for the pay of agents, rents, office expenses, &c. $47,278 90

The annual tonnage towards Lowell, of raw cotton, is tons, 10,000
And of Anthracite and Bituminous coal, - - - 12,000
And there go back to Boston, in manufactured goods, about tons, - - - - - - - - - - 10,000

Total tonnage, - - 32,000

The burthen cars carrying the above tonnage are fitted up with springs, buffers, &c., so as to travel as easily as the passenger coaches.

There are altogether about 100 bridges for passing common roads, either over or under the Boston and Lowell rail road. In only two or three instances are the crossing of common roads on a level with the rail road, and at such places men are stationed to keep the track clear of impediments.

For a printed form of the *Passenger Coach Diary* kept at Lowell, see document B, annexed: and for a printed form of the *Passenger way bill*, kept upon this road, see document C, hereto annexed.

Boston and Worcester Rail Road.

Through the kindness of Nathan Hale, President of the company, we were enabled to traverse and examine into the police and other particulars of this road, in company with William Jackson, Superintendent of repairs, or "General Agent," and James F. Curtis, Agent of transportation; and to obtain definite information connected with the carrying department from Horace Williams, Treasurer.

Locomotive Engines.

The number of these owned by the company is nine, viz:

2	made by Baldwin, called the "Elephant," and "Wm. Penn," each	9	tons.
1	made by the Mill-dam Works, the "Yankee,"	9	"
1	" Lowell Company,	9	"
1	" Bury, of Liverpool, "Lion,"	9	"
4	" Stephenson, each	6	"

Of these 9 engines, 5 are in constant use.

The larger ones carry from Boston to Worcester, per trip, an average of 42 tons of freight (of 2,000 lbs. per ton) in 15 cars, each weighing 4000 lbs., equal to a gross load of 64.2 tons, exclusive of the engine and tender. The smaller engines carry in the same direction only 16 tons of freight, (2000 lbs. per ton) in five cars of the same weight, viz: 4000 lbs. each. Each running engine makes a circular trip daily, equal to 88 miles per day.

These trains traverse curves of 954 feet radius, and ascents of 40 feet per mile.

These 9 engines have run alternately for 6 months, and the expenses per trip of 44 miles between Boston and Worcester, averaged, for all the engines engaged both in the tonnage and passenger business, are as follows:

Fuel, dry pine, $10\frac{1}{3}$ feet, (the cord being 8 feet)	7 90
Oil, best winter strained spermaceti,	1 32
Repairs of engines,	5 80
Total expenses per trip (but not including the car expenses,) amounting to	$15 02

The smaller, or 6 ton engines, are found to be very uneconomical, being more subject to derangement, and carrying much lighter loads than the 9 ton engine, with the same cost of agents, and nearly the same expense of fuel. It was stated that upon the 4 smaller engines, (all made by Stephenson) eleven cranked axles had broken in $2\frac{1}{2}$ years' use.

It was stated that the price of wood is variable, but has averaged to the company about $5 50 per cord, ready for the engine. This is less than the cost upon the Boston and Providence rail road, which is $7 00 per cord; and the difference was explained to arise from the less distance of haul from Boston of the wood which

the Worcester company procure at that point; and also from the circumstance that the latter company obtain much of their fuel along the line of their road, though of inferior quality, such as white pine, birch, &c.

The working of the road, &c.

Mr. William Jackson furnished the following statement in reference to the winter business of the road, during the years 1834, 5 & 6, embracing the operations of the four months of December, January, February and March;

	Receipts.	*Expenses.*	*Nett income.*	*Loss.*
1834-5,	$8,327 79	$11,076 29	$	$2,748 50
1835-6,	32,463 00	31,570 00	893	
1836-7,	53,969 00	25,293 00	28,676	

The tonnage of freight *westward* is to that *eastward*, about as 4 to 1.

Horace Williams, Treasurer, states the operations upon the road, more fully, as follows:

During the second six months of the year 1835, the number of freight trips was 523, and there were

Tons of freight outward, 4084, or per trip, - 16 tons
do inward, 748, do - - 2¼ "

In the same period, the receipts for freight, were, per trip outward, - - - - - - - - $57.49
And per per trip inward, - - - - - - 5.74

Run of Engines 12 *months to December* 31*st*, 1836.

Lion,	built by Bury, - - - -	18,163	miles
Jupiter,	" Stephenson, - - - -	16,819	"
Rocket,	" do. - - - -	14,579	"
Mercury,	" do. - - - - -	12,302	"
Comet,	" do. - - - - -	11,583	"
Lowell,	" at Lowell, - - - -	8,877	"
Wm. Penn,	" by Baldwin, - - - -	8,469	"
Meteor,	" Stephenson, - - - -	7,611	"
Yankee,	" at Mill-dam works, - -	5,836	"
Equal to 2,370 trips of 44 miles each, - -		104,239	miles

Quantity of wood used—2,687 cords, at a cost of $15,241.

The locomotive operations of the first six months of 1836, exhibited the following results:

Passenger trips, in number, - - -	624
Freight, do. do. - - -	393
Total, - - -	1,017

Fuel used, 1212 cords wood, being 9½ feet, or $1\frac{3}{16}$ cords per trip of 44 miles, cost of fuel $6.73 per trip.

The oil used was 1977 gallons. Tallow 850 lbs. the cost of both $1,906.

Tons of freight outward 5771, being per trip 29½ tons.
do. do. inward 1190 do. do. - 6 "
The receipts per trip outward on the above - - $95.00
do. do. inward do. - - 18.87
The passenger business in the same period, gave,
Tickets sold 24,847, for - - - - - $39,785.22
Cash received in the cars, - - - - - 4,819.86

Being per trip $71.50, - - - - - $44,605.08
The locomotive operations of the second six months of the same year, (1836) were as follows:
Passenger trips, in number, - - - - - 788
Freight do. do. - - - - - - 565

Total, - - - - - - - - - 1353
Fuel used, 1475 cords, being 9 feet=1½ cords per trip at a cost of $6.20 per trip.
The oil used was 1936 gallons. Tallow, 604 lbs. and the cost of these was $1686.
Tons of freight outward 8,676, or per trip, - 31 tons.
do. do. inward 1,591, or do. - - 6 "
The receipts per trip outward, were - - - $99.00
do. do. inward, were - - - 18.30
The passenger business in these 6 months of 1836, amounted to:
Tickets sold 31,880, for - - - - - $39,576.11
Cash received in the cars, - - - - - 36,611.05

Being per trip $96.70. $76,187.16
The small engines carried per trip, freight 16 tons, and earned, - - - - - - - - - $57.49
The large engines carried 31 tons, and earned - - 99.00
The number of cars, engines, &c. owned by this company, on the 30th June, 1837, was as follows:

46 close cars.
21 wool and cotton cars, (open.)
8 coal do.
18 lumber, do. (9 sets.)
14 dirt, do. (in order.)
5 stone, do.
24 passenger, do.
viz: 14 square double spring.
2 small square, N. S.
3 Baltimore.
2 New Jersey.
3 Forward.
2 baggage cars.
1 Pickering's snow clearer.
4 small snow ploughs.
10 engines, 9 tenders.
4 horses, in Boston, Worcester, Farmington & Westboro.

Run of Engines for 6 months, ending June 30th, 1837.

Lion,	built by Bury,	9,495	miles.
Mercury,	" Stephenson,	9,418	"
Lowell,	" at Lowell,	8,539	"
Yankee,	" Mill-dam,	7,290	"
Comet,	" Stephenson,	6,684	"
Elephant,	built by Baldwin,	3,080	miles, put on road, April 22d.
Rocket,	" Stephenson,	2,265	"
Wm. Penn,	" Baldwin,	1,730	"
Meteor,	" Stephenson,	1,686	"
Jupiter,	" do.	932	" broke down March 14th (not repaired.)
		51,119	miles.

Being 1162 trips of 44 miles each.

viz: Passenger trips,	620
Freight do.	214
Gravel do.	328
Total,	1162

The fuel, oil, and repairs of engines and tenders, per trip, as herein before stated, was - - - - $15.02

Repairs of freight cars per trip, $1.94; being on 93 cars; and was exclusive of the following new articles employed to replace others originally defective, viz:

16 new wheels,	$208
64 springs,	672
36 axles and fitting,	1026
	$1906

Repairs of passenger cars per trip, $2.84—these were done entirely on 17 cars, and a large part of the cost was to replace work originally defective.

Freight carried per trip, out, 42 tons; avails,	$136.50
do. do. in, 9 tons; do.	29.69
Average receipts per trip with passengers,	93.04

Police and management of the Road.

Tickets are sold in Boston and Worcester for the trip, and for different places along the line, although passengers are not *required* to have them, but may pay for their seats to the conductor, who keeps a memorandum of what he thus receives, and returns the amount with the tickets he collects, to the ticket seller. The names of passengers are not entered by the conductor. This agent, previous to making his return to the ticket seller, communicates the contents of his memoranda to the General Superintendant's Clerk, as a check on the ticket seller, who makes his return of the tickets sold and money received to the General Superintendant.

This last mentioned return is made daily by the ticket seller at

Boston, through whom the one at Worcester likewise makes his daily returns, remitting the cash received by the conductor. The tickets which the passengers *may* have are collected by the conductor (called the carsman) while the train is travelling.

The Officers and Agents of the Company, are,

A President, and the Directors.
1 Clerk to the Board and Corporation.
1 General Agent, salary $3,500 per annum.
1 Superintendent, do. 3,000 do.
Treasurer, with 1 clerk.
Register, for transfer of stock in New York.
1 Depot master at Boston, } each at $1000 per annum.
1 Freight do. do. }
1 Depot master at Worcester, } each at $600 per annum.
1 Freight do. do. }
These freight masters have each one clerk.
1 Ticket seller at Boston.
1 Clerk to Superintendent.
7 Agents at way depots, pay from $400 to $500 each, per annum.
2 Car masters, or conductors of trains, pay $600 per annum, each.
5 Enginemen, at $2 per day each.
5 Firemen, at $1 do. do.
6 Brakemen, at $1 do. do.
1 Principal machinist, at $3 per day; with his
9 Assistants, at from $1.50 to $1.75 per day, each.
4 Blacksmiths.
1 Carpenter, at $3 per day; and his assistants.

With such freight laborers, wood sawyers, depot men, &c. as the business from time to time requires.

The Carrying Department is under the immediate supervision of the Superintendent, whose salary is $3000 per annum. This department includes the repairing of the engines and cars; the purchase of fuel, oil and materials. All bills of this nature before being paid, must be approved by this officer, who from time to time pays over to the Treasurer, in sums of $1000, and upwards, the excess of the revenue of the concern, whether arising from tolls, rents, or otherwise. The Superintendent's accounts of receipts and expenditures are made out monthly, and audited and approved by the Treasurer and a committee of the Directors.

The Locomotive Department is under the immediate charge of the depot masters, who are responsible that the engines, cars, &c., are in good order; and they give to the machinery frequent and careful examinations; keep the time for which the mechanics and laborers in the engine yard are employed; and expedite the movements of the trains, and give orders to the enginemen, who, in fact, are their aids.

The Freight Department is under the immediate charge of the freight masters, who are responsible for the prompt forwarding of all merchandise. They are assisted by the Agents at the way-depots, and report to the Superintendent.

The Passenger Department is under the immediate charge of the Superintendent, assisted by the ticket seller, and carsmen, or conductors.

The General Agent has charge of the construction of such parts of the road and depots as remain unfinished, and he also directs the repairs of the road. His salary is at the rate of $3,500 per annum for the time spent in the service of the company.

The overseers for the repairs of road have $2 per day, each, and their assistants, from $1.12 to $1.50 per day, each.

The clerks in the employ of the company receive from $400 to $800 each per annum.

We were furnished by the Treasurer of this company with certain printed rules, forms, and directions connected with the police establishment, which it is thought proper to annex, as follows;

General rules, marked D.

Blank report of tickets sold and cash taken in the cars, marked E.

Notice to the Agents at the depots, marked F.

Rules and regulations for the locomotive department, marked G.

Directions for clearing off the snow, marked H.

Miscellaneous.

It was stated that for the lubrication of the axles, in summer, *tallow* is used instead of oil, at a saving of $1,000 in 6 months. In winter, oil is used of necessity, as the tallow will not melt sufficiently at so low a temperature. To avail of the use of tallow made it necessary to change the size and form of the journal box, which, in general, could not be deemed expedient.

The burthen cars are of Baltimore manufacture, and have wheels of 33 inches diameter, being the size preferred here.

The tolls and transportation charged upon this road are about 7¼ cents per ton per mile.

From the 1st of January to the 31st of December, 1836, the receipts for the fare of passengers, amounted to - - - - - - -	$120,792.24
And for freight, - - - - - - - -	59,781.42
For rents and interest, - - - - - -	2,612.37
And surplus from the previous year, - - - -	1,272.67
Total, - - - - - -	$184,458.70
The current expenses during the same year, including the cost of transportation, the wear and tear of engines and cars, and the repairs of the road, amounted to - - - -	$103,673.70
Balance of profits, - - - -	$80.785.00

Of which sum a dividend of $75,000, equal to 5 per cent. on the capital then paid in, was declared.

At present, (November 22d, 1837,) the capital expended, is as follows:

For the construction of the 44 miles of road, -	$1,450,000
Real estate, right of way, depot buildings and machinery,	250,000
Total amount expended upon the Boston and Worcester Rail Road, - - - - -	$1,700,000

New Jersey and Patterson Rail Road.

This road is 16 miles in length from Jersey city (opposite to New York) to the town of Patterson, only 14 miles of which, that is, from Bergen Hill to Patterson, is at present (24th November, 1837,) traversed by locomotive engines. Horse power is employed on the two miles over the hill, and next to Jersey city.

The company are allowed, by charter, to charge 6 cents per ton per mile for the transportation of property, and 6 cents per mile for the conveyance of each passenger. However, the entire charge which the company are allowed to make is $4 per ton on all merchandise carried from New York to Patterson, and this is to remunerate the company not only for the use of the rail road and its machinery, but likewise for the teams which they keep at both ends of the road, by which the goods are carried between the city of New York and the rail road, as well as between the same road and the factories at Patterson. The charge is 62½ cents per passenger for the entire distance between New York and Patterson.

For this information and what follows in relation to the operations of this company, we are indebted to the politeness of James L. Morris, President.

Locomotive Engines.

The company have four engines, one of which, called the "Whistler," weighing about 8 tons, was built at Lowell; one called the "McNeill" of 7 tons, built by Stevenson; and two of 8½ tons each, burn anthracite coal, built by Gillingham and Winans, of Baltimore. One of the two latter engines, called the "Baltimore," has been in possession of the company upwards of a year, whilst the other has been very recently received, and therefore has not yet done much work.

In a circular trip of 28 miles from Patterson to Bergen Hill, and back, the "Whistler" burns, inclusive of that required for getting up the steam and for loss from occasional delays, one cord of dry pine wood, the cost of which prepared for the engine is about $5.75. The "McNeill" consumes three quarters of a cord in performing equal duty.

In three circular trips between the same points, making a distance of 84 miles, the "Baltimore" burns 3000 lbs. of anthracite

coal, the cost of which is at the rate of $7 per ton. With this consumption of coal the load drawn is an average of about 30 tons, exclusive of the engine and tender. The coal used is that from the Beaver Meadow, and much preferred to the Peach mountain coal, as being easier of combustion, and more economical. In running the coal engine the fire is drawn and renewed at the end of the second trip, in which operation about 200 lbs. of coal are unavoidably lost; and in lighting up the anthracite coal fire, about "a wheelbarrow full" of pine wood is consumed, the cost of which is defrayed by the sale of the *cinder* at $2 per ton.

It was further stated that the principal transportation on this road being of cotton and woollen, either raw or manufactured, coal is much preferred as a fuel, on account of its safety, the sparks from the wood-burning engines having on several occasions set on fire the contents of the cars, and also burnt the grass of the marshes as well as the fences.

Repairs of the Engines.

It was stated that the "Baltimore" had run every day for the last 9 months, her 3 trips of 84 miles, without losing a single trip; and that her repairs had not probably cost more than 50 cents per day for that time. She has still under her the same wheels (of cast iron, 3 feet diameter) she had when new, more than a year ago, and that she had done about two-thirds of all the tonnage and passenger transportation of the road, the running speed being from 12 to 20 miles per hour.

The head engineman (Mr. Hughes) thinks that the repairs of the "Whistler" per day would be twice those of the "Baltimore" under equal performances. No precise or definite statements, however, under this head, could now be obtained, but was promised to be sent to us by letter. We were further informed that the principal or heavy repairs are done at the establishment of Rogers, Ketchum and Grosvenor, in Patterson, whilst only the ordinary or light repairs are made at the rail road company's work shop by the three enginemen during the recesses, when they or any of them are not actually on the road, running their engines. The enginemen being engaged and paid by the month, the time not employed by them in actual motion upon the road, is devoted to cleaning and taking care of the engines, and making such ordinary and light repairs as their limited force and time will allow.

Subsequently a letter was received from Mr. Morris, president, dated the 14th December, 1837, stating that from the 1st of April to the 1st of December of that year,

"The 'McNeill' wood engine, imported from England, made by Stephenson, has cost $829.25, and is now in good order.

"The 'Whistler' wood engine, made at Lowell, $613 25, and requires a repair which is estimated at $300.

"The 'Baltimore' coal engine made in Baltimore, $208.15, and is now in good order. She has worked against both of the wood

engines, and I think has performed two-thirds of all the work during the 8 months I have had charge of the road.

From the 1st of May until the 9th of October, we were running 8 times over the road each day (with the exception of Sundays) making a distance of 112 miles per day, during the month of April, and since the 9th of October, we have been running 6 times per day, making a distance of 84 miles per day. On Sundays we run but 4 times, making a distance of 56 miles per day."

It will be borne in mind that the minor repairs made by three enginemen, as previously mentioned, are not included in the amounts now given; and consequently that we could not obtain a full statement of the entire cost of repairs of engines upon this road; at the same time it would appear that the "Baltimore" coal engine was the most efficient and economical.

Camden and Amboy Rail Road.

The following details were obtained from John Stevens, Esquire, in travelling with him from Bordentown to Philadelphia, on the 25th November, 1837.

Locomotive Engines.

The number of locomotive engines owned by this company is 15, of which 12 are in constant use, averaging a running distance of 50 miles per day each. These engines weigh from 8 to 10 tons each, and have 4 wheels of an equal diameter of 4½ feet, with *pilot* wheels in front, that give direction to the foremost pair of the 4½ feet wheels, the latter being therefore not coupled with the remaining pair of 4½ feet or driving wheels. Each engine in the performance of the above named work of 50 miles per day, costs per annum about $4,000, including wages of enginemen at $50 per month, and of fireman at $35 per month, and cost of fuel, at the rate of three-fourths of a cord of wood for a run of 35 miles, including that consumed in getting up the steam, and waiting for steam boats. The day's work of each engineman and fireman is to run a passenger engine a circular trip of 70 miles between Amboy and Bordentown; and for any addition to such daily work they receive extra pay.

It was further stated that this company is now building, and have nearly completed, an engine upon 8 wheels, and having two cylinders of 18 inches diameter by a 3 feet stroke; the whole supposed to weigh 18 tons. The power is to be geared to the two hind pairs of wheels, which are connected by side rods. The two forward pairs of wheels are also connected similarly by side rods, but the frame of the latter is allowed a freedom of motion around a pintal supporting that end of the boiler. The adhesion upon the rails of all the 8 wheels is to be brought into action by means of cog wheels upon the middle of the axles of the two intermediate pairs of wheels; and to accomplish this the cogs will be formed to allow the requisite play in the frame containing the two forward pairs of

wheels. This engine is designed to lead burthen trains at moderate rates of speed; but must be viewed as yet in the light of an experiment.

Mr. Stevens expressed to us his opinion that 25 per cent. of the original cost of engines, would pay for their *repairs and depreciation.*

Philadelphia and Columbia Rail Road.

On the 1st of December, 1837, and as stated in the first part of our report already mentioned, made the 8th of January last, we went upon this rail road from Philadelphia to the State's work shop at Parkesburgh, 44 miles from Broad street, or 40 miles from the head of the inclined plane at the Schuylkill; our object being principally to obtain information in regard to the performances of the locomotives upon this road, and their consumption of fuel, and *repairs:* And for this we hoped to meet with the very efficient superintendent of motive power, Alexander Mehaffy. In the absence of that officer, however, our enquiries were kindly attended to, and as far as practicable answered, by John Brandt, the Superintendent of the shop.

The engines of M. W. Baldwin, of Philadelphia, are decidedly preferred by the agents of this road, who propose to employ hereafter, engines of this manufacture exclusively.

Regarding the fuel of the locomotive engines, it appeared on enquiry, and from our personal observation, that wood of almost any kind, and most procurable, and in every stage of seasoning, was used successfully; but to ensure a sufficiently free combustion, and rapid generation of steam in such circumstances, it was necessary to burn bituminous coal in conjunction with the wood; and for that purpose the Pittsburg coal was preferred. The average cost of the wood was $4.25 per cord, and of the coal, 30 cents per bushel, or from $9 to $10 per ton.

The following tabular exhibit of the names and performances of all the engines run upon this road, in the year next preceding the 1st of November, 1837, was furnished by Mr. Brandt, who has also indicated the name of the manufacturer of each engine.

Account of the performance of the different locomotives on the Philadelphia and Columbia Railway, for the year ending October 31st, 1837.

Names of Engines.	No. of miles travelled.	Number of cars hauled.	Number of trips made.	Average No. of cars pr. trip.	Names of Manufacturers.
Conestoga, . . .	2,695	774	35	22⅛	M. W. Baldwin,
Parkesburgh, . .	10,626	2906	138	21	do.
Downingtown, .	11,242	2918	146	20	do.
Edward F. Gay, .	10,549	2857	137	20	do.
Indiana, . . .	10,164	2815	132	21⅓	do.
Mississippi, . .	4,081	1060	53	20	do.
Montgomery, . .	5,882	1177	66	18	do.
Octorara, . . .	2,464	632	32	20	do.
Pequa, ...	1,848	472	24	19⅔	do.
Wisconsin, . .	308	73	4	18	do.
Virginia, . . .	16,632	1920	216	8⅞	do.
Paoli, ...	16,170	1872	210	9	do.
Westchester, . .	12,936	1665	168	10	do.
Juniatta, . . .	17,479	2156	227	9½	do.
Schuylkill, . .	6,160	762	80	9½	do.
Pennsylvania, . .	7,931	987	103	9½	do.
Ohio, ...	8,085	1147	105	11	do.
Lancaster, . . .	11,319	1500	147	10⅓	do.
Columbia, . . .	4,389	517	57	9	do.
Delaware, . . .	10,549	1320	137	9⅔	do.
Brandywine, . .	10,395	1457	135	11	do.
Philadelphia, . .	7,777	999	101	11	do.
Susquehanna, . .	6,391	845	83	10⅓	do.
Kentucky, . . .	7,084	1102	92	12	do.
United States, . .	693	171	9	19	William Norris,
Independence, .	154	34	2	17	do.
Constitution, . .	231	82	3	27	do.
Bush Hill, . . .	616	135	8	17	do.
Wash. Co. Farmer,	3,157	380	41	9¼	do.
James Madison, .	1,232	198	16	12⅓	do.
Benj. Franklin, .	2,772	294	36	8⅙	do.
Robert Morris, .	154	21	2	10½	do.
Back Woodsman,	1,309	197	17	11⅔	McClurgh, Wade &
Pittsburger, . .	1,078	108	14	7⅘	Co., Pittsburg.
Bald Eagle, . .	1,463	271	19	14¼	Garrett & Eastwitck.
Telegraph, . . .	3,696	550	48	11½	do.
Enterprise, . . .	1,155	213	15	14⅕	do.
Sampson, . . .	7,425	1084	95	11¼	Coleman, Sellers &
Planet, ...	308	33	4	8	Young, [Sons.
Anthracite,* . .	539	60	7	8½	Garrett & Eastwitck.

*The last Engine does not belong to the State.

On the 1st of December, 1837, Mr. Brandt, in reply to certain enquiries, addressed a letter to M. W. Baldwin, in relation to the operations and repairs of the engines, a copy of which he permitted us to take, and is as follows:

"*Parkesburg Shop, December 1st*, 1837.

DEAR SIR: In reply to your letter of the 27th, I inform you that I have run one of your engines one trip, in order to ascertain the cost of fuel, &c., drawing 35 loaded cars from Columbia to Philadelphia, a distance of 77 miles, making 163 tons, 1224 lbs. the weight of engine and tender not included. The whole amount of expenses were as follows, viz:

2 cords wood, $4, - - - - - - -	$8.00
15 bushels bituminous coal, - - - - -	4.20
Engineman and Fireman's wages, - - -	3.25
Water and Woodman's wages, - - -	1.50
5 Quarts oil, - - - - - - - -	1.37½
	$18.32½

You will please bear in mind that the quantity of fuel consumed depends much on the number of tons the engine is drawing. The State not having a sufficient number of your engines until the first of last May, I only make you a statement of cost of repairs of ten of your engines up to November 1st, 1837, a term of six months, showing the number of trips, number of miles, number of cars, and amount of expenses.

Trips.	*Miles.*	*Cars.*	*Expenses.*
1361	104,797	21,131	$3,118.99

I have not given you any account of depreciation, but I would say 10 per cent. on first cost quite enough. The following will show the number of trips, number of miles, number of cars drawn, and amount of repairing expenses for the year ending October 31st, 1837.

Trips.	*Miles.*	*Cars.*	*Expenses.*
2974	229,116	38,764	$18,567.06

Note.—The above amount of $18,567.06, is the cost of repairs of locomotives alone and at job prices.

The detail of the foregoing amount of repairs of engines, and the designation of the engine and the maker, with the appurtenant remarks was likewise furnished by Mr. Brandt, as in the following tabular statement:

Repairs of Locomotive Engines used for passengers and tonnage on the Philadelphia and Columbia Rail Road, for the year ending October 31st, 1837.

Name of Engine.	Name of Maker.	Expenses of Repairs.	Remarks.
Delaware 1, . .	Baldwin,	$811.00	2d class wants repair, out of use.
Sampson 2, . .	Coleman, Sellers & Sons,	157.00	The amount placed opposite to each engine includes 35 pr. ct. profit on the *nett cost* of repairs.
Susquehanna, .	Baldwin,	222.75	2d class, encountered Juniatta, not yet repaired, will cost $1500.
Ohio, ...	do	544.52	2d class, ran against car on siding, accident cost $300.
Kentucky, . . .	do	1301.00	2d class, lent to Harrisburg R. Road, was run off that road.
Schuylkill, . .	do	2095.35	2d class, ran off road, accident not included, almost rebuilt, ran 16,000 or 17,000 miles without loosing a trip.
Philadelphia, . .	do	1062.30	2d class, wants repairs, run down.
Pennsylvania, .	do	2607.80	2d class, ran off track and shattered to pieces, repairs of accident $1307.
Robert Morris, .	Norris,	1145.50	Met with accident:
Wash. Co. Farmer,	do	33.00	Runs between Phila. and Schuylkill, repaired by the maker.
Geo. Washington,	do	948.97	On Portage Rail Road.
Columbia, . . .	Baldwin,	452.40	2d class, now in running order, intended for 4 wheels and made 6 wheeled engine, not a good machine.
Juniatta, . . .	do	1398.60	2d class, outside connexion, encountered Susquehanna at Cotesville bridge, repairs of accident cost $695.
Brandywine, . .	do	882.90	2d class, in running order, outside connection.
*Westchester, .	do	1060.93	2d class, in shop, dome gave way.
Lancaster, . .	do	1242.45	2d class, charged with $440, for new tender used by other engine, oldest engine on road.
*Wisconsin, . .	do	126.50	1st class, turned into ferry-boat engine at Clarke's ferry on Susquehanna.
*Downingtown, .	do	190.27	1st class, at work.
*Ed. F. Gay, . .	do	181.75	1st class, do
*Parkesburg, . .	do	168.15	do do on Columbia Rail Road,
*Montgomery, .	do	59.00	do do
*Indiana, . . .	do	367.30	do
*Mississippi, . .	do	133.00	do ran off road while road was repairing, cost of repairs, accident not included, will cost $400.
*Paoli, ...	do	95.53	2d class, running,
*Virginia, . . .	do	238.58	2d class, running with passengers, ran into burther train, accident cost $150.
*Pequa, . . .	do	913.00	1st class running.
*Conestoga, . .	do	127.50	After 35 trips taken to Portage Rail Road, 1st class.
*Octorara, . .	do		1st class, repairing at Baldwin's expense, fire box gave way.
	Total,	$18567.06	

Note.—The engines marked thus (*) have done nearly all the work on the road for the last six months preceding the above date.

The first class engines consume about one-third more fuel than second class, and do double the work.

The curves upon this road are very numerous, and of short radii, frequently of 600 feet, and in some instances even less; whilst the grades are often at the rate of 30, and in places 45 feet to the mile. Hence the necessity of the use of heavy and powerful locomotives, and of such at the same time, as will traverse curves of such sudden flexure. The driving wheels being of large diameter, (4 to 5 feet) a single pair of these *behind*, and a truck of 4 smaller wheels, (2 to 2½ feet diameter) *before*, constitute the six wheels of the engine, admirably suited for such a curved road.

From M. W. Baldwin we ascertained that he now makes engines of two classes; the first heavy, and for tonnage draft at a speed not exceeding 10 or 12 miles an hour, so limited, not so much from a want of capacity in the generation of steam, as from injury to the road, to result from so heavy a machine moving at higher speeds. The second class, of lighter make, for the conveyance of passengers at any velocity consistent with safety.

It was stated by Mr. Baldwin, as well as by Mr. Brant, that an engine of the 2d class, called the "Paoli," had made 175 trips in as many successive days, between the Inclined plane at the Schuylkill, and that at the Susquehanna, a distance of 77 miles, without receiving or needing any repairs whatever; and that the cessation of her trips at the end of that time, was made necessary only from the wearing out of the journal boxes, the engine in all other respects appearing in good order

The following table contains the weights, cost, &c., as furnished by him to us, of four of Baldwin's make of engines, owned by the commonwealth of Pennsylvania, and running, or to run, upon the Philadelphia and Columbia Rail Road.

Class of Engine.	Name of Engine.	Total weight in lbs.	Weight on driv'g wheels.	Weight on truck wheels.	Total weight in tons.	Cost of engine & tender.	Diam. of cylinders in inches	Length of stroke in inches
First,.....	Conestoga,	26,090	12,120	13,970	11.65	$7,500	12	16
Second,..		20,700	9,150	11,550	9.24	$6,500	11	16
Second,..	Middleton,	19,950	9,700	10,250	8.90	$6,500	11	16
Second,..	Mount Joy,	20,775	10,600	10,175	9.27	$6,500	11	16

These weights are said to include fuel and water.

The attachment of the tender to the engine is such, that by means of a screw a portion of the weight of the former equal to about 2000 lbs. can be transferred to the driving wheels of the latter, by which the adhesion and tractile power of the engine can be increased in such parts of the road, as from their rate of ascent may demand it.

It was stated by Mr. Baldwin that he had met with but a single instance of the fracture of a crank axle in his engines, out of 100 that he had made. The crank in the axle is *single*, being inserted

by its wrist, into the nave of the driving wheels. He prefers the connection, which this crank affords, of the piston with the axle on the inside of the driving wheels, alleging that an outside connection tends more to rack the engine and the road. In this opinion Mr. Brandt concurred.

The engine of the 1st class has 150 copper tubes of $1\frac{1}{8}$ inches diameter, and 7 feet 5 inches long; and the engine of the 2d class has 118 copper tubes of the same diameter, and 6 feet 5 inches long.

The average duration of the driving wheel tires is considered to be about 9 months, the engine running every day.

Spark Catcher.

Two kinds of these are used upon this road; the one being placed at the top of the chimney, and the other at the bottom of it. The former is considered by Mr. Brandt as interfering the least with the draft. The flat part of the wire netting on top is said to wear out in about 3 or 4 weeks, whilst that on the surrounding sides endures 6 months. The second kind from its proximity to the tubes, is liable to be quickly burnt out by the intensity of the flame, at the same time it is admitted to be the most effective in preventing the exit of sparks from the smoke stack, as, in this case, the exhaust pipe terminates above the netting, and therefore does not propel the sparks through the chimney with so much energy as in the other method. On the whole, however, of such importance is the draft to the efficiency of the engine, that the top of the chimney, with the necessary expansion, and where the heat is less intense, will probably continue to offer the best position for the spark-catching apparatus.

NEW CASTLE AND FRENCHTOWN RAIL ROAD.

The foundry at New Castle, and other works attached to this road, were visited by us on the 4th December last; and through the attention of Mr. Dobbs, the Superintendent of the repairs of locomotives, we obtained the following information.

The company had their engines repaired at a shop of their own in New Castle, until the last few months, within which time the repairs have been executed at the engine manufactory of the New Castle Company.

The company owning the rail road have six locomotive engines, as herein after described, only three of which are at present in constant activity; viz: *two* for passengers, each conveying a train a circular trip of 33 miles per day, and *one* for freight, leading a train two circular trips, or 66 miles per day, and occasionally, three such trips, or 99 miles in a day. Mr. Dobbs thinks that the double of the work now done upon the road, might be accomplished by four engines in all. He gives a decided preference to the English form of locomotives as exhibited in the engines of Stevenson's make upon this road: but in order to insure a greater degree of steadiness in the motion upon the track, he would prefer in all cases that the forward end of the engine should be supported and guided by a

truck of four smaller wheels, as in the "Comet," that being the only engine of this arrangement now upon this road. The following table contains a statement of the six engines, and the repairs of four of them, from the 16th August to the 4th December, 1837.

Name of Engine.	Weight in tons.	Diameter of wheels.	Number of wheels.	Weight in tons on driving wheels	Diam. of cylinders in inches.	Length of stroke in inches.	Cost of repairs from Aug. 16, to Dec. 4, 1837	Name of Manufact'r
Virginia,.....	9.	5 ft. & 3 ft.	4	6.	11	16	$227.56	Stevenson.
Pennsylvania	9.	5 & 3	4	6.	11	16	23.25	do
Delaware, ...	8.	5 & 3	4	5½	11	16		do
Phoenix,.....	8.	4½	4	5½	9	20	40.88	do
Comet, ...	7.5	5 & 1.83	6	5.	11	16		do
New Castle,..	9.	5 & 3	4	6.	11	16	50 90	E.A.G.Young

Of the above engines, each have 109 copper tubes, $1\frac{1}{8}$ inches diameter by 6 feet 10 inches long, except the "Virginia." whose tubes are 7 feet 6 inches long. The "Pennsylvania" was the first engine imported for this road; and the four wheels under the "Phoenix" are of equal size, ($4\frac{1}{2}$ feet) and connected so as to work with the adhesion of all of them.

The "Virginia" has been employed almost exclusively as a passenger engine, and has been running about 5 years. For the 17 months, ending in December, 1836, she ran every day a circular trip of 33 miles, and cost but about $50 in repairs. She is still a good engine and without much show of depreciation. She has had but one new set of tires upon her wheels, in the way of repairs; rendered necessary from the wearing out of the flanges, the tread remaining good. The new wheels thus furnished cost $200, and is a part of the item of $227.56 in the foregoing table.

The cylindrical part of the boilers of these engines is of plates $\frac{7}{16}$ inches in thickness. The boiler heads are of $\frac{1}{4}$ inch plates, and the copper of the tubes is $\frac{1}{16}$ in thickness. The working effective steam pressure in the boiler is said to be 75 lbs. per square inch.

It was further stated that one cord of wood is consumed by a passenger engine in a circular trip of 33 miles, inclusive of that burnt in lighting up the fire, and raising the steam, and in waiting upon the steam boats.

The foregoing pages comprise, in addition to what is contained in our report of the 8th of January, all the information collected by us in our tour to the North herein before mentioned, and which we now most respectfully submit without further comment.

J. KNIGHT,
Chief Engineer.
BENJ. H. LATROBE,
Engineer of Location and Construction.

APPENDIX.

A

BOSTON AND PROVIDENCE RAIL ROAD.

Instructions for Conductors and Enginemen while passing over the road.

1. The Conductor has sole charge of the train; he will direct the Engineman when to *stop*, and when to *start*.

2. The Conductor will report, immediately on his arrival at the Depots, any disobedience of orders, on the part of the Engineman.

3. Conductors of morning trains—which leave Boston and Providence at the same hour—will pass each other at the Foxboro' turn-out; the train first arriving will take the turn-out, if both trains arrive at the same time, the train *from* Boston will take the turn-out.

4. The Steam Boat train from *Boston* will proceed without other than the stops necessary to discharge and receive passengers at Dedham Branch, Canton, Mansfield and Attleboro'. The Conductor of this train will, if the Steam Boat train from *Providence* have not arrived before his departure, proceed with great caution, sounding his bell at *short intervals*, while passing round curves.

5. The Steam Boat train from *Providence* will proceed with the greatest care; the Conductor will keep a good look-out, sending one of his Brakemen ahead to *look round* curves, if he have any doubt with respect to the vicinity of a train which may be expected approaching him. The Conductor of this train is positively ordered not to leave a turn-out, if he have any reasonable expectation of meeting another train before he can reach the next turn-out, he will detain the train on a turn-out, rather than run any risk whatever—he will keep constantly in his mind, that the position of his train on the road is not known to Conductors and Enginemen of trains approaching him.

6. Trains will at all times move round curves slowly and with a good look-out; the engine bell will be rung at intervals of time, until the engine has passed from the curve on to the straight line.

7. The engine bell will be rung when a train is within eighty rods of a "crossing," (*which it will approach slowly,*) and will continue to be rung until the train occupies the "crossing."

8. Conductors will daily compare their time with the time at the Depots.

9. Trips will be made in not less than two and a half hours.

10. Conductors will, when the train arrives at Seekonk, going to Providence, look out for a blue flag on the Tockwotten Hotel; and if one be displayed, the train will take the Seekonk turn-out, and remain there till the flag is lowered;—and also the signal on the Wood House, at India Point; if the black board be across the staff, *stop*, as the draw of the bridge is open.

11. The road-crossings at Guy Carleton's, in Roxbury, at the Toll Gate, and near Mr. Lowell's, will be passed particularly slow.

12. Nettings over the smoke-pipes will always be fastened down, while an engine is running over the road.

13. *Rule at "Worcester Rail Road Crossing."*—When a Worcester train is *coming in*, the Providence train will stop; at all other times, the Providence train goes ahead. Always ring the bell in foggy weather or at night, when within 100 rods of this crossing.

14. If, on the arrival of a train at a turn-out, where a meeting with another train is usual, and the expected train has not arrived, the Conductor, after remaining on the turn-out fifteen minutes, will send a Brakeman forward with orders to proceed as rapidly as possible; he will carry in his hand the signal of a Brakeman, viz: a blue flag. If, in fifteen minutes after the Brakeman has started, the expected train shall not have arrived, nor the Brakeman returned, the Conductor will proceed with his train, moving with due *care* and *prudence*.

A train which may be detained on the road, from any cause, more than thirty minutes, *before arriving at the turn-out, where a meeting is usual and expected*, and is afterwards able to proceed, will do so, with *great care*. The Conductor of this train will recollect the rule which requires the Conductor of the train expecting to meet him at any particular turn-out, to *wait thirty minutes*, and then *proceed*,—his calculations will be made accordingly. The Conductor of a train thus delayed, will never pass his train round a curve without sending a Brakeman ahead, who will take a station at the extreme end of the curve, holding conspicuously a blue flag.

B

BOSTON AND LOWELL RAIL ROAD.

Passenger Coach Diary.—Departure from Lowell.

DATE.			Arrival at BOSTON.	ENGINE.	ENGINEMAN and FIREMAN.	CONDUCTOR and BRAKEMAN.	CARS.	Amount received for tickets at $	Amount received for tickets at $	Amount received for tickets at $	Amount received for Way Passengers.	Amount received for Extra Baggage.
Day of Month.	Day of Week.	Hour.										

C

BOSTON AND LOWELL RAIL ROAD.

Way Passengers.

	To Boston.	Medford.	Woburn.	Beers Ridge.	Andover Br.	Richardson's	Billerica.	Lowell.	Amount.
From									
Boston, ...									
Medford, ...									
Woburn, ...									
Beers Ridge, . .									
Andover Bridge,									
Richardson's, . .									
Billerica, ...									
Lowell, ...									

D

BOSTON AND WORCESTER RAIL ROAD.

General Rules.

1 *Freight* trains following passengers, stop at Natick and Hopkinton, and meet at Framingham after passengers have passed.

2. To allow time for *freight* to arrive at those stopping places, passenger trains must arrive at *Natick* in 1.40 from Worcester, and at *Hopkinton* 1.35 from Boston; and on no part of the road be run at a more rapid rate than 11 miles per hour.

3. Complaint is made that our trains cross roads too fast. Passenger engines should not cross at a speed exceeding 12 miles an hour, and freight 8 miles.

4. *Freight* trains, having waited three-quarters of an hour for any other train (either passengers or freight) beyond their proper time of arrival, are to proceed carefully with engine only, to see what detains them and render assistance.

Proper time of Arrival, Passenger Trains.

	Hours.	Min.
At Angiers, from Boston,		25
Needham, "		45
Natick, "	1	
Framingham, "	1	20
Hopkinton, "	1	35
Westborough "	2	
Worcester, "	2	50
At Westborough, from Worcester,		40
Hopkinton, "	1	10
Framingham, "	1	20
Natick, "	1	40
Needham, "	2	
Angiers, "	2	20
Boston, "	2	45

E

BOSTON AND WORCESTER RAIL ROAD.

Report of Tickets sold and Cash taken in the Cars, this day of 183 .

DEPOTS.	Price.	1st out.	2d Out.	3d Out.	Total.	Dollars.	Cts.	In from.	In from.	In from.	Price.	Total in.	Dollars.	Cts.
Brighton, ...														
Angiers, ...														
Newton, ...														
Needham, ...														
Natick, ...														
Framingham, ...														
Hopkinton, ...														
Southboro'														
Westboro'														
Grafton, ...														
Worcester, ...														
Cars-men's Cash, ..														
Freight Passengers,														

F

BOSTON AND WORCESTER RAIL ROAD.

NOTICE.

The agents at the depots on the road will take especial care, to see that the gates are all right, and will keep them locked whenever the business of the road will permit. Be sure to have them locked at night, leaving the main track clear.

They willl make their return of cash and tickets sold daily to the ticket-seller in *Boston*, and of freight money to the superintendent's clerk.

☞ In case of accident, whereby any engine or car is disabled on the road, they will take the proper measures to get them on to the nearest turn-out or off the track, as circumstances may require.

J. F. CURTIS, *Superintendant.*

G

BOSTON AND WORCESTER RAIL ROAD.

LOCOMOTIVE DEPARTMENT.

Rules and Regulations adopted by the Corporation to be observed by the Enginemen, and considered as forming the basis of their engagements with the Company.

I. No *Engineman* will be employed who does not feel and show by his conduct a regard for the interest of the Company,—taking great care of his valuable machine, examining her closely, seeing that she is kept in fine order, well oiled, and fit for the road; and when out, being careful how she is run.

II. While on the road with the passenger trains, the Enginemen are to consider the train as under the command of the Carsman, and will follow his directions as to stopping and starting.

III. When on the road with freight trains, the Enginemen are considered as having charge of the same, and are expected to do whatever is necessary for the safe transportation of the goods. They will stop at the several Depots, and take such freight as the persons in charge of them may wish to send.

IV. No smoking of tobacco allowed on our premises, nor on the engines, tenders or cars; nor is any one allowed to ride with the Engineman, except his Fireman; and as punctuality is essential to the success of the road, they will be careful to have their engines on the track, and ready to start at the appointed signal, and be sure to arrive at the stopping places with precision.

V. The Enginemen, in conformity with a law of this state, are strictly charged and exhorted to ring their *bell*, at all road crossings, at least 80 rods before they cross.

II

BOSTON AND WORCESTER RAIL ROAD.

SNOW.

During the present winter, it is expected that the rail road will be cleared of snow, principally by the engines and snow ploughs, and the services of the snow contractors will therefore be dispensed with, unless specially called upon. The Agents at the depots are expected, after a heavy fall of snow, to turn out with a horse scraper and a few men, and pass over the track from one depot to the other, to wit:

Agent at	Worcester	clears to	Grafton.
"	Grafton	"	Westborough.
"	Westborough	"	Southborough.
"	Southborough	"	Hopkinton.
"	Hopkinton	"	Framingham.
Agent at	Boston	clears to	Angier's Depot.
"	Angier's	"	Washburn's Bridge.
"	Joshua Washburn's	"	Needham.
"	Needham	"	Natick.
"	Natick	"	Framingham.

The proper team will consist of two horses and four men.

It is especially necessary to turn out promptly after a wet storm of snow and rain, as severe cold usually follows. Last year the road was closed a week, for want of a few hours' labour at the right time. Activity and energy on the part of the Agents, will be *duly* appreciated by the Corporation.

December 5, 1836. J. F. CURTIS, *Sup't.*